Towards Digital Twins for soccer robots: a use case in reusing artifacts

Demo at ModDiT 2021 @MODELS workshop, October 12th 2021, Online

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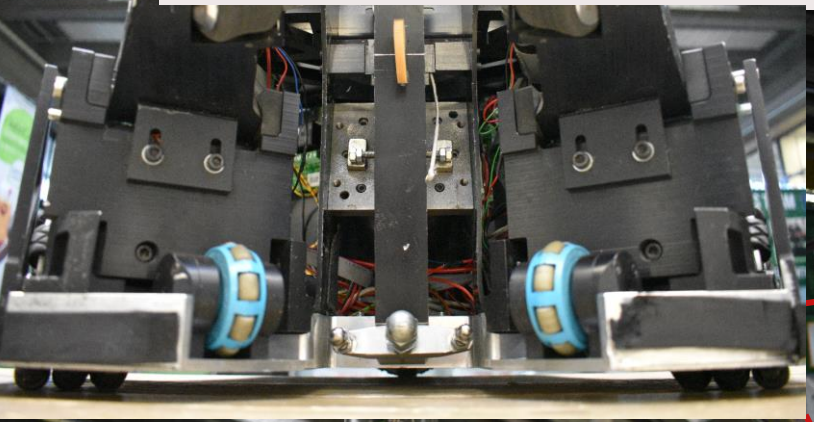
Robot soccer at TU/e—Middle size league (MSL)



General rules and restrictions:

- Inspired by FIFA regulations
- 1 goalie + 4 players
- Individual “eyes” and “brain”, nothing centralized

Science, Software Eng

Digital Twin for soccer robots

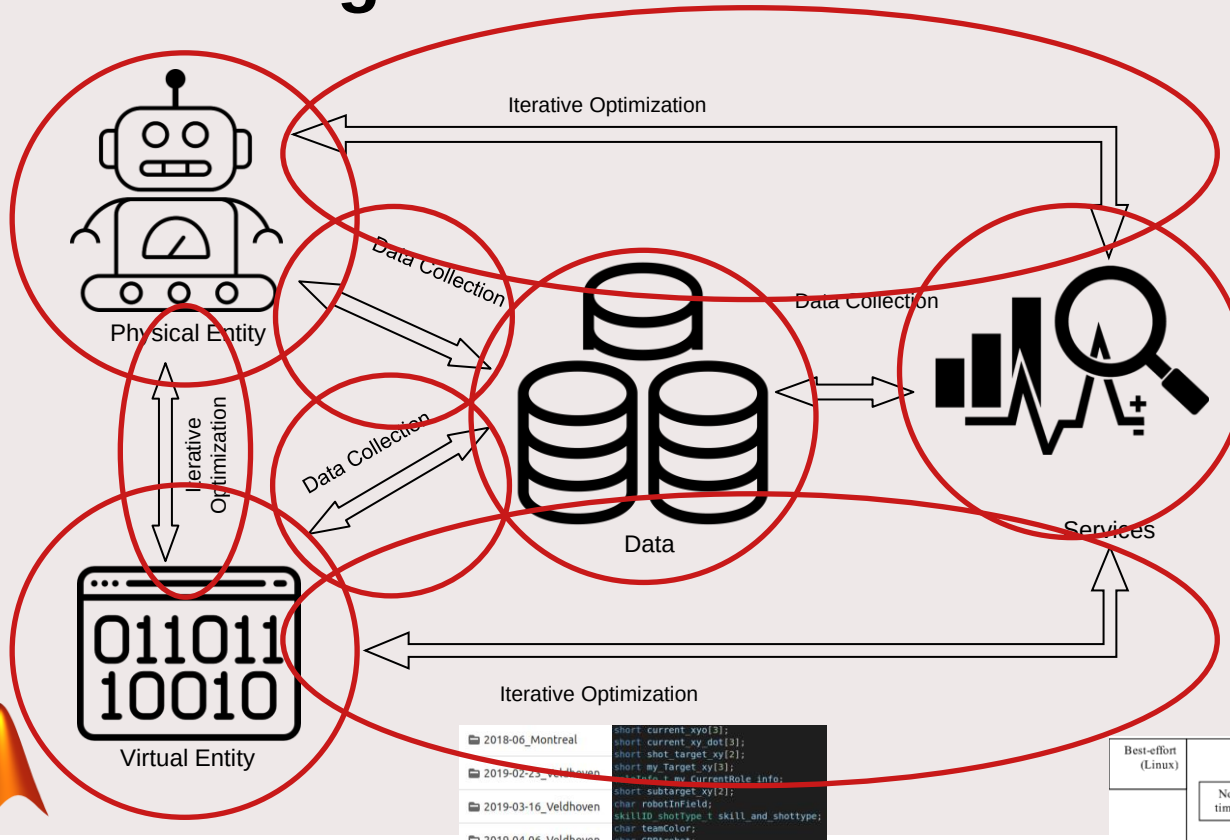
Digital Twin could be used to:

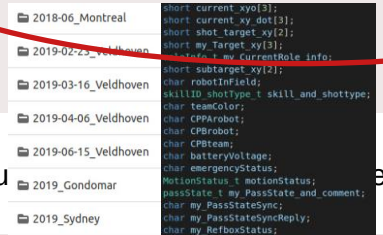
- understand hardware and software
- analyze performance
- test changes
- apply new techniques e.g. ML

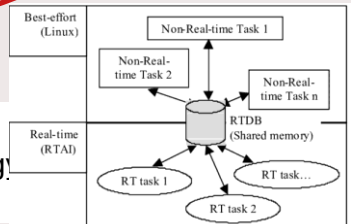
But: longstanding project

→ Can existing artifacts be used to realize DT?

Digital Twin 5D Model







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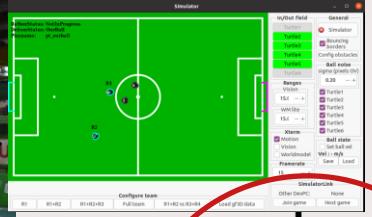
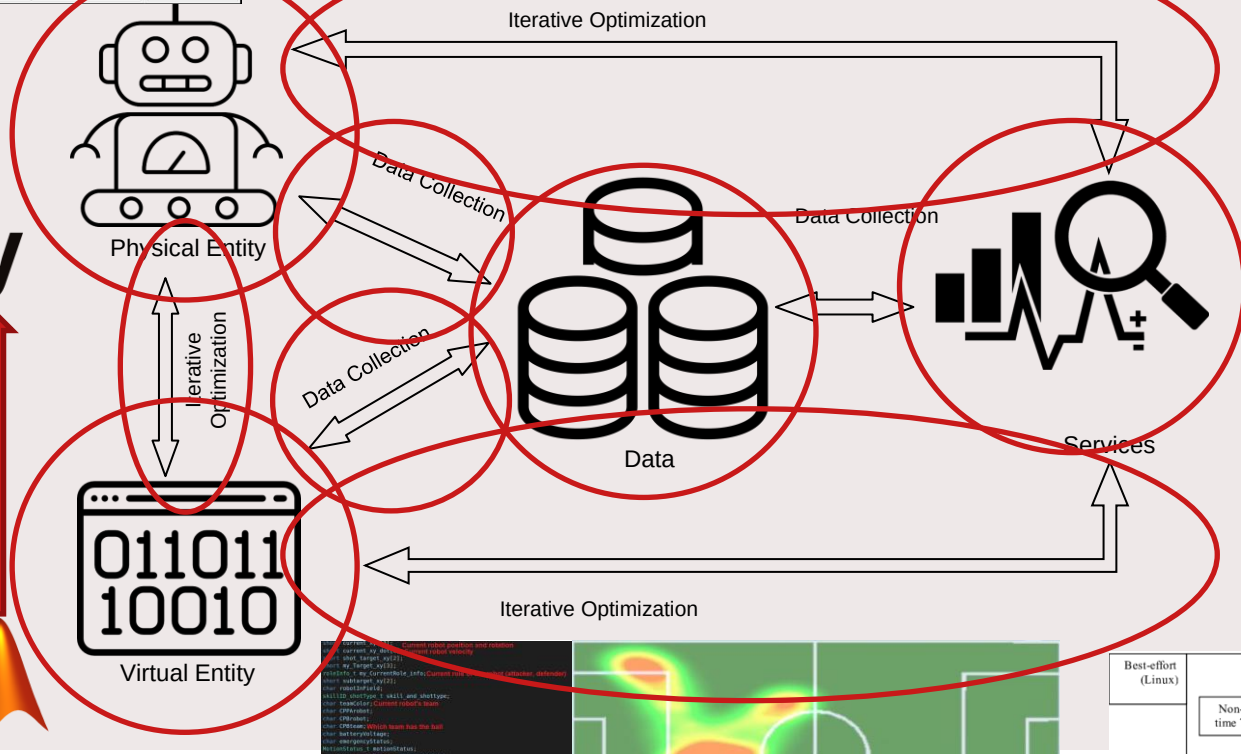
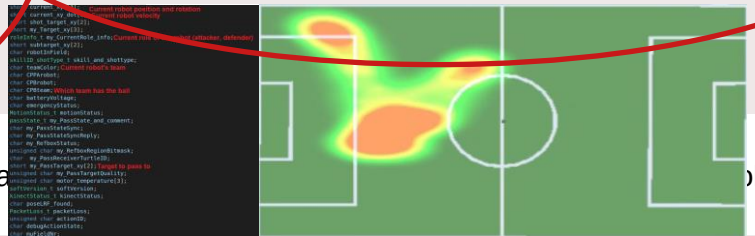
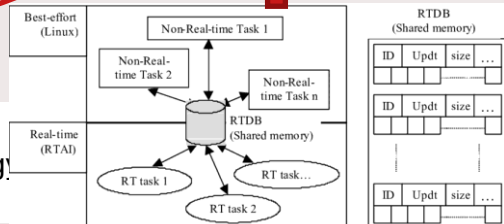
Reusing the artifacts









Demo

Conclusion

- Existing artifacts save time in creating DT
- Easier to maintain and use due to reuse
- Still need knowledge of subsystems and domain expertise

Future work

This use case:

- Swap in components, test behavior
- Analyze data flow real-time
- Conduct predictive maintenance
- Troubleshoot from afar

General:

- Conduct more case studies to generalize
- Looking at artifacts: which, what phase, what purpose